CLAIMS

1. A process for formation of a layer of tantalum pentoxide (Ta_2O_5) on a carrier material, comprising:

heating carrier material to a heating temperature of between approximately 200°C and 400°C; and

circulating a gas mixture comprising tert-butyliminotris (diethylamino) tantalum ($t\text{-}BuN{=}Ta(NEt_2)_3$) in contact with the heated carrier material under an oxidizing atmosphere thereby forming a layer of tantalum pentoxide (Ta_2O_5) on the carrier material, the partial pressure of the tert-butyliminotris (diethylamino) tantalum being greater than or equal to 25 mTorr.

2. The process according to Claim 1, wherein the heating temperature is between approximately 300°C and 350°C.

3. The process according to Claim 1, wherein the gas mixture is circulated in a chamber in which the carrier material is placed and in that the partial pressure of the tert-butyliminotris (diethylamino) tantalum is less than the vapor pressure of tert-butyliminotris (diethylamino) tantalum corresponding to the temperature of the coldest point in the chamber.

4. The process according to Claim 1, wherein the partial pressure of the tert-butyimiotris (diethylmino) tantalum is between approximately 65 mTorr and 70 mTorr.

5. The process according to Claim 1, wherein the gas mixture comprises oxygen.

6. The process according to Claim 1, wherein the gas mixture comprises a carrier gas, for example nitrogen.

7. The process according to Claim 1, wherein the gas mixture is circulated in a chamber in which the carrier material is placed and in that the replacement time of the gas mixture in the chamber is between 0.1 second and 10 minutes, for example of the order of 1 to 10 seconds.

8. The process according to Claim 1, wherein the carrier material is a semi-conducting material, for example silicon.

9. The process according to Claim 1, wherein the carrier material is a metallic material.

10. The process according to Claim 9, wherein the metallic material is chosen from the group formed by titanium nitride, tantalum nitride, copper, platinum, aluminum, titanium, tantalum and ruthenium.

11. The process according to Claim 1, wherein the carrier material is a dielectric material.

12. The process according to Claim 11, wherein the dielectric material is chosen from the group formed by silicon dioxide (SiO_2), silicon nitride (Si_3N_4), alumina (Al_2O), ZrO_2 and HfO_2.

13. The process according to Claim 1, wherein the thickness of the layer of tantalum pentoxide formed is of the order of a few tens of nanometers, for example 44 nanometers.

14. The process according to Claim 1, wherein the carrier material is positioned on a circular wafer having a diameter of substantially one of 200 mm and 300 mm.

15. The process according to Claim 1, wherein the layer of tantalum pentoxide is for incorporating in one or more electronic integrated circuits.

16. A device for the formation of a layer of tantalum pentoxide (Ta_2O_5) on a carrier material, comprising:

heating means for heating carrier material;

injection means for circulating a gas mixture in contact with the heated carrier material thereby forming a layer of tantalum pentoxide (Ta_2O_5) on the carrier material, wherein the heating means is for heating the carrier material to a heating temperature of between approximately 200°C and 400°C, and in that the gas mixture comprises tert-butyliminotris (diethylamino) tantalum (t-BuN=Ta(NEt_2)$_3$) under an oxidizing atmosphere, the partial pressure of the tert-butyliminotris (diethylamino) tantalum being greater than or equal to 25 mTorr.

17. The device according to Claim 16, wherein the heating temperature is between approximately 300°C and 350°C.

18. The device according to Claim 16, further comprising a chamber in which the carrier material is placed and in that the partial pressure of the tert-butyliminotris (diethylamino) tantalum is less than the vapor pressure of tert-butyliminotris (diethylamino) tantalum corresponding to the temperature of the coldest point in the chamber.

19. The device according to Claim 16, wherein the partial pressure of the tert-butyliminotris (diethylamino) tantalum is between approximately 65 mTorr and 70 mTorr.

20. The device according to Claim 16, wherein the gas mixture comprises oxygen.

21. The device according to Claim 16, wherein the gas mixture comprises a carrier gas, for example nitrogen.

22. The device according to Claim 16, further comprising a chamber in which the carrier material is placed and in which the gas mixture circulates and in that the replacement time of the gas mixture in the chamber is between 0.1 second and 10 minutes, for example of the order of 1 to 10 seconds.

23. The device according to Claim 16, wherein the carrier material is a semi-conducting material, for example silicon.

24. The device according to Claim 16, wherein the carrier material is a metallic material.

25. The device according to Claim 24, wherein the metallic material is chosen from the group formed by titanium nitride, tantalum nitride, copper, platinum, aluminum, titanium, tantalum and ruthenium.

26. The device according to Claim 16, wherein the carrier material is a dielectric material.

27. The device according to Claim 26, wherein the dielectric material is chosen from the group formed by silicon dioxide (SiO_2), silicon nitride (Si_3N_4), alumina (Al_2O_3), ZrO_2 and HfO_2.

28. The device according to Claim 16, wherein the thickness of the layer of tantalum pentoxide formed is of the order of a few tens of nanometers, for example 44 nanometers.

29. The device according to Claim 16, wherein the carrier material is positioned on a circular wafer having a diameter of substantially one of 200 mm and 300 mm.

30. The device according to Claim 29, wherein the chamber comprises a single wafer.

31. The device according to Claim 29, wherein the chamber comprises several wafers.

32. The device according to Claim 16, wherein the layer of tantalum pentoxide is for incorporating in one or more electronic integrated circuits.

33. An integrated circuit, comprising:

at least one capacitor comprising tantalum pentoxide positioned between two electrodes, the at least one capacitor being obtained by a process comprising:

heating carrier material to a heating temperature of between approximately 200°C and 400°C; and

circulating a gas mixture comprising tert-butyliminotris (diethylamino) tantalum ($t\text{-}BuN{=}Ta(NEt_2)_3$) in contact with the heated carrier material under an oxidizing atmosphere thereby forming a layer of tantalum pentoxide on the carrier material, the partial pressure of the tert-butyliminotris (diethylamino) tantalum being greater than or equal to 25 mTorr.

34. The integrated circuit according to Claim 33, wherein the tantalum pentoxide has a thickness of between approximately 25 nanometers and 65 nanometers and exhibits, under a voltage difference applied between the two electrodes equal in absolute value to 3.6 volts approximately, a leakage current, measured in amperes per cm^2 of tantalum pentoxide surface area, of approximately less than $10^{-((x+20)/10)}$.

35. The integrated circuit according to Claim 33, wherein the electrodes comprise titanium nitride in contact with the tantalum pentoxide.

36. The integrated circuit according to Claim 33, wherein the electrodes comprise a semi-conducting material, for example silicon.

37. The integrated circuit according to Claim 33, wherein the electrodes comprise a metallic material.

38. The integrated circuit according to Claim 37, wherein the electrodes comprise a material taken from the group formed by tantalum nitride, copper, platinum, aluminum, titanium, tantalum and ruthenium.

39. The integrated circuit according to Claim 33, wherein the thickness of the layer of tantalum pentoxide formed is approximately equal to 44 nanometers.